



SCIENTIFIC AQUATIC SERVICES

Reg No. 2003/078943/23
VAT Reg No. 4020235273
PO Box 751779
Gardenview
2047
Tel: 011 616 7893
Fax: 086 724 3132
Email: admin@sasenvgroup.co.za
www.sasenvironmental.co.za

**FRESHWATER ECOSYSTEM VERIFICATION AS PART OF
THE ENVIRONMENTAL AUTHORISATION PROCESS FOR
A PROPOSED RAILWAY LINE FOR BEESHOEK MINE,
NEAR POSTMASBURG, NORTHERN CAPE**

Prepared for

EnviroGistics (Pty) Ltd

April 2021

Revised: July 2021

Prepared by:	Scientific Aquatic Services
Report author:	A. Mileson
Report reviewer:	S. van Staden (Pr.Sci.Nat)
Report Reference:	SAS 220169
Date:	April 2021
Revision 1:	July 2021



SAS Environmental Group of Companies

TABLE OF CONTENTS

TABLE OF CONTENTS	ii
LIST OF FIGURES	iii
LIST OF TABLES	iii
GLOSSARY OF TERMS	iv
1 INTRODUCTION	1
1.1 Project Description	2
1.2 Assumptions and Limitations.....	6
2 DEFINITIONS	7
3 OUTCOMES OF THE APPLICATION OF THE DEA SCREENING TOOL	8
4 RESULTS OF THE DESKTOP ANALYSIS	8
4.1 Analyses of Relevant Databases.....	8
4.2 Review of Historical Aerial Imagery	14
5 SITE ASSESSMENT RESULTS	15
6 OPPORTUNITIES AND CONSTRAINTS APPLICABLE TO THE DEVELOPMENT OF THE PROPOSED RAILWAY LINE	20
7 REFERENCES	21



LIST OF FIGURES

Figure 1:	The locality of the proposed railway line and associated investigation area in relation to the surrounds, depicted on digital satellite imagery.	4
Figure 2:	The location of the proposed railway line and associated investigation area as depicted on a 1:50,000 topographic map.	5
Figure 3:	Location of the depression wetland (“cryptic wetland”) identified by the NFEPA (2011) database in the investigation area associated with the Calcrete Material Source area.	11
Figure 4:	Location of the depression wetland (“cryptic wetland”) identified by the NBA (2018) database in the investigation area associated with the Calcrete Material Source area.	12
Figure 5:	Ecological Support Areas and Other Natural Areas indicated by the Northern Cape Critical Biodiversity Areas (2016).	13
Figure 6:	Aerial photograph dated 1966 of the vicinity, depicting the proposed railway line in relation to the surrounds. Although there are some indications of a potential pan slightly south of Tommy’s Field Airport (indicated by the blue arrow), this feature no longer exists as it has been excavated.	15
Figure 7:	The upgradient reach of the artificial drainage line (left) depicting <i>T. capensis</i> , and the downgradient reach (taken during a field assessment in October 2020, for an initial feasibility study), showing the absence of obligate or facultative vegetation.	17
Figure 8:	The northern seasonal depression, in October 2020 (left) and (right) February 2021 (Acknowledgement: A. Pirie).	17
Figure 9:	The location and approximate extent of the artificial drainage line, seasonal depressions and single cryptic wetland in relation to the proposed railway line and associated surface infrastructure.	19

LIST OF TABLES

Table 1:	Desktop data relating to the freshwater ecological characteristics of the proposed railway line and surrounding region.	10
----------	--	----



GLOSSARY OF TERMS

Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Hydromorphy:	A process of gleying and mottling resulting from the intermittent or permanent presence of excess water in the soil profile.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Obligate species:	Species almost always found in wetlands (>99% of occurrences).
Seasonal zone of wetness:	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50cm of the surface
Temporary zone of wetness:	The outer zone of a wetland characterised by saturation within 50cm of the surface for less than three months of the year.
Watercourse:	In terms of the definition contained within the National Water Act, 1998 (Act 36 of 1998) a watercourse means: <ul style="list-style-type: none"> • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; and a reference to a watercourse includes where relevant, its bed and banks.
Wetland:	<ul style="list-style-type: none"> • Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soils, which may, in turn, influence the ecological characteristics and functioning of wetlands.



1 INTRODUCTION

Scientific Aquatic Services (SAS) was appointed to conduct an investigation considering the freshwater ecology as part of the Basic Assessment (BA) and Authorisation process for the development of a railway line and associated infrastructure (please refer to Section 1.1) to service the existing Assmang (Pty) Ltd owned Beeshoek Iron Ore Mine (“the mine”), near Postmasburg, Northern Cape Province. The location of the railway line and associated infrastructure in relation to the mine is depicted in Figures 1 and 2, Section 1.1.

In addition to identification and verification of potential watercourses, SAS was requested to consider relevant zones of regulation in accordance with relevant legislation (specifically Government Notice (GN) 509 as published in the Government Gazette 40229 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) and the National Environmental Management Act, 1998 (Act No. 107 of 1998)). In order to identify all watercourses that may potentially be impacted by the proposed railway development, a 500m “zone of investigation” around the proposed project components, in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), was used as a guide in which to assess possible sensitivities of the receiving freshwater environment. This area – i.e. the 500m zone of investigation around the proposed project components – will henceforth be referred to as the “investigation area”.

A desktop study was compiled with all relevant information as presented by SANBI’s Biodiversity Geographic Information Systems (BGIS) website (<http://bgis.sanbi.org>) as well as the National Freshwater Ecosystem Priority Areas (NFEPA) database, followed by a delineation, using desktop methods that include the use of available digital satellite imagery, of all the watercourses situated within the study area as well as the investigation area. Following this, a field verification assessment was undertaken to ground truth all results.



1.1 Project Description

Assmang (Pty) Ltd is the holder of new order rights in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) in respect of high-grade hematite iron ore deposits at the Beeshoek Mine, on the farms Beeshoek and Olynfontein. The mining method currently entails an opencast mining operation, which consists of five (5) active opencast pits (Village Opencast Pit, HF Opencast Pit, BF Opencast Pit, East Opencast Pit, Beeshoek North (BN) Opencast Pit). Although other opencast pits are dormant at this time, these are continuously assessed in terms of their economic value for intended remining. The current resources of the mine are approximately 87 million tonnes with a reserve of about 26 million tonnes.

The Beeshoek Mine can be broadly categorised as follows:

- Northern mining area (North Mine): This area comprises active as well as historical mining areas. Several small quarries and mine residue dumps of various categories are located within this area. The area also includes the Iron Ore Beneficiation Plant, Slimes Dam, as well as the BN Opencast Pit;
- Main Offices, Village (demolished) and recreational area; and
- Southern mining area (South Mine): This area comprises large opencast pits and associated Waste Rock Dumps (WRDs). The Village Opencast Pit and associated WRD are the main activities in this area. This area also includes a crushing and screening area as pre-preparation of the run of mine iron ore before being routed by overland conveyor to the Iron Ore Beneficiation Plant located at the North Mine.

To allow Beeshoek to export iron ore through the Saldanha Port in the Western Cape Province, the mine has investigated the options of linking Beeshoek to the Transnet Freight Rail (TFR) Ore line, via the existing Kolomela Direct Link, allowing Beeshoek Mine greater flexibility. Negotiations with Transnet have not as yet been concluded in terms of allocations, and for this reason the project is presented as the best practical outcome.

The line will comprise a 2.8 km main link line of approximately 5.5 m in width with a 5 m bulk fill (varies along the alignment). The line will tie from the existing TFR Postmasburg line at the Beeshoek Iron Ore Mine, crossing over the road accessing Tommy's Field Airport. The existing R385 road will be lifted into the road-over-rail system to allow for the railway line to cross under the R385 regional tar road before linking to the existing TFR Yard that services Kolomela Mine. Considering that one 4 m access road will be constructed along the alignment with an 8 m buffer on either side of the railway line, the approximate extent of the development is 9 ha (85 400 m²). During the construction phase, the Tommy's Field Airport will be closed for a limited period to allow for the road crossing. A temporary road deviation (of less than



1 km, will be provided for vehicles travelling on the R385 during the construction of the road bridge. The approach of TFR is to run trains with three rakes of 116 wagons, giving trains a total length of 348 wagons. For this reason the current operational concept is for Beeshoek to load a single train rake (116 wagons) to form part of a three rake train (348 wagons) which would be transported to Saldanha. The other two rakes of the train will be loaded by Kolomela.

The project requirements will include:

- Overall Design:
 - Railway formation – 5.5 m
 - Bulk fill – 5 m
 - One service road – 4 m
 - Buffer – 8 m on each side
- TFR train design
 - 348 wagons (3 x 116 rakes)
 - 30t axle load
- Beeshoek Traffic
 - 1 x 116 rake (Saldanha traffic)
 - 30t axle loads

Additional infrastructure associated with the railway link includes various material source pits, laydown areas and stockpiles. According to the layout provided by the proponent, these areas are located within existing mining areas and will therefore not entail the removal of vegetation nor encroach on potentially sensitive ecosystems.

Figures 1 and 2 depicts the Railway Link in relation to the Beeshoek Mine and surrounding areas.



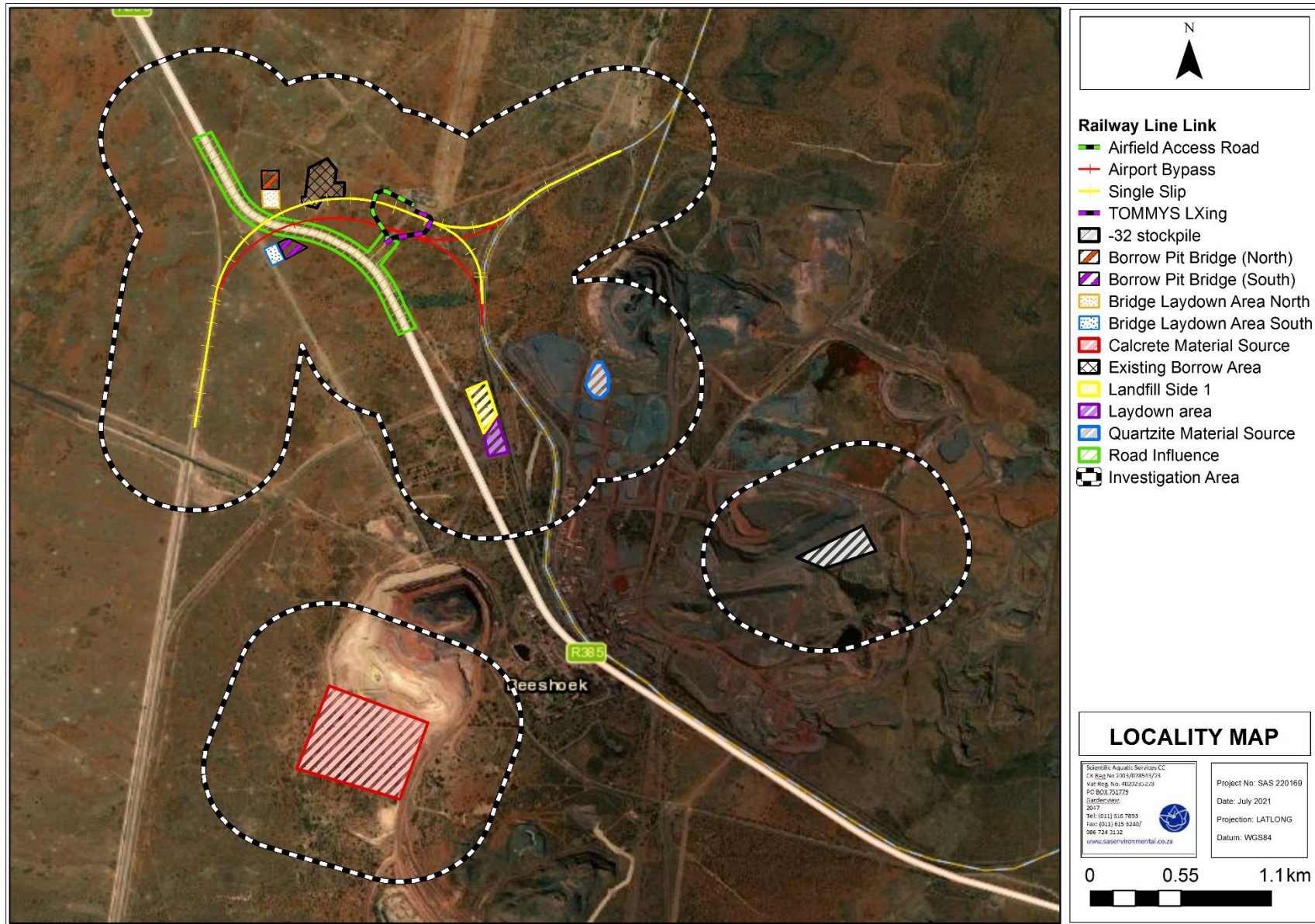


Figure 1: The locality of the proposed railway line and associated investigation area in relation to the surrounds, depicted on digital satellite imagery.



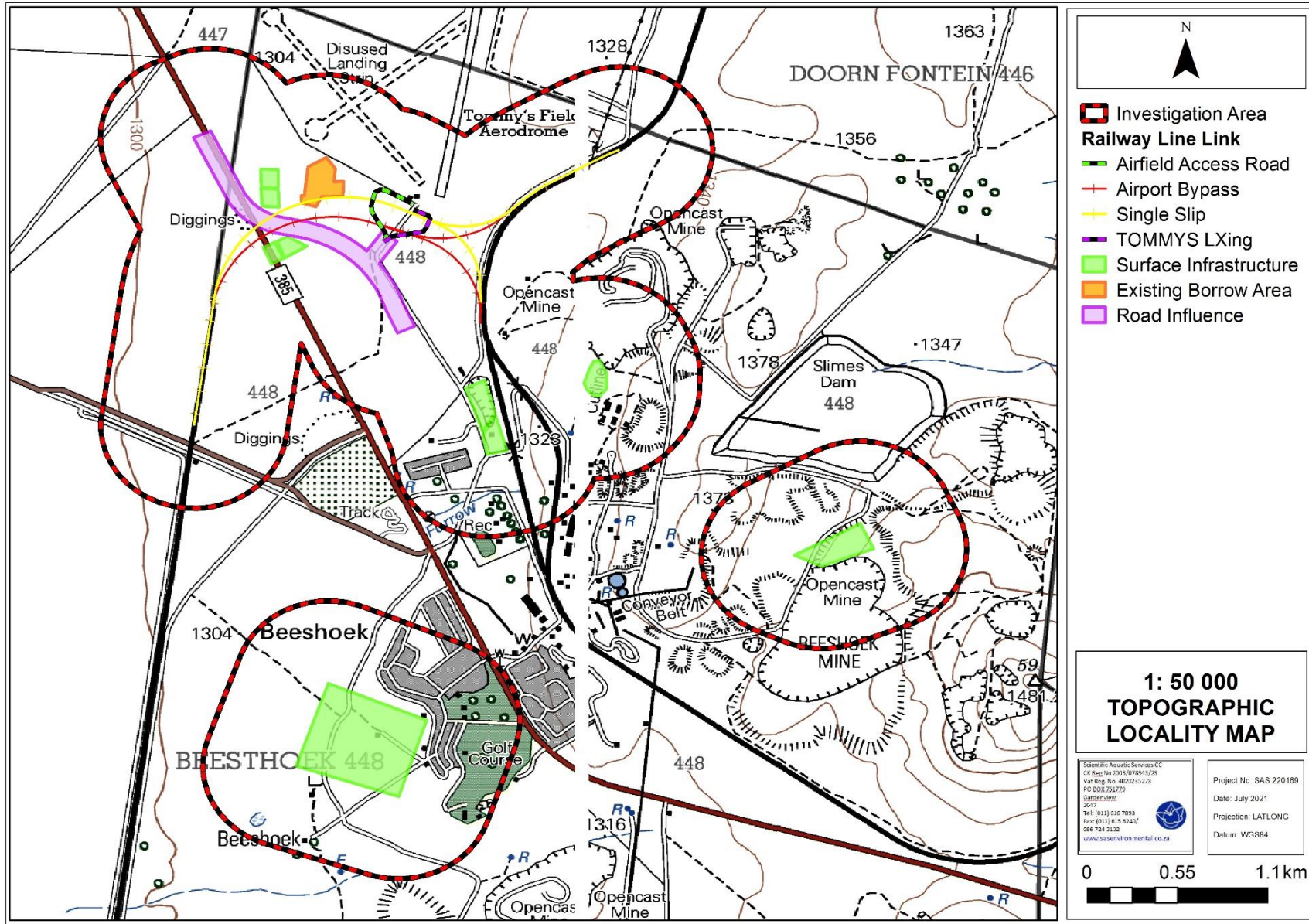


Figure 2: The location of the proposed railway line and associated investigation area as depicted on a 1:50,000 topographic map.



1.2 Assumptions and Limitations

- The determination of potential watercourse boundaries are confined to the proposed railway alignment and within 500 m thereof. All watercourses or potential watercourses identified within the investigation area were delineated in fulfilment of GN509 of the National Water Act, 1998 (Act No. 36 of 1998) using various desktop methods including use of topographic maps, historical and current digital satellite imagery, and aerial photographs;
- Notwithstanding the above, the proposed railway line is considered unlikely to pose any significant risk to potential watercourses situated further than 100 m from the proposed railway. Thus, the field assessment focused on the proposed footprint and within 100 m thereof, whilst the remainder of the investigation area was assessed using desktop methods;
- Further to the above, it must be noted that the proposed layout changed marginally due to project and practical requirements, in the period between the field investigation (March 2021) and the date of this report (July 2021). Nevertheless, the amended layout did not change sufficiently to warrant an additional field investigation. Additionally, field-verified data obtained for the purposes of an Environmental Impact Assessment (EIA) process for various expansion activities for Beeshoek Mine were utilised to inform this investigation where required (please refer to SAS¹ 2021 for further detail if required);
- Watercourses and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the watercourse boundaries may occur. However, if the Department of Water Affairs and Forestry (DWAF) (2008) method is followed, all assessors should get largely similar results;
- The basis of South African methodologies for the formal identification and delineation of wetlands is primarily that of soil morphological indicators such as mottling and gleying, and presence of hydrophytic vegetation. However, a number of wetland types and conditions have been identified in which these soil morphological indicators do not readily apply, including temporary wetlands in very arid areas (such as Postmasburg), which are often either “too shallow, too saline, or too temporarily inundated” to exhibit typical wetland indicators in their soils (Day *et al*, 2010). According to Day *et al* (2010) such wetlands are referred to as “cryptic” and cannot always be reliably identified as wetlands during either normal dry season (depending on locality) or extended dry periods (such as in very arid

¹ Scientific Aquatic Services (SAS). 2021. Freshwater Ecological Assessment as part of the Environmental Impact Assessment and Water Use Authorisation Processes for the Proposed Mining Expansion Activities at the Beeshoek Iron Ore Mine, Near Postmasburg, Northern Cape Province. Prepared for Envirogestics (Pty) Ltd. Unpublished specialist report.



regions or following prolonged drought) on the basis of standard wetland identification and delineation tools (i.e. the use of DWAF, 2008). Nevertheless, a number of abiotic and biotic features indicate periodic wetness and were thus used in conjunction with visual analysis of soils and topography to identify possible watercourses within the investigation area;

- As far as practical, the presence and character of watercourses was verified during the site assessment, and the information pertaining to the character of the receiving freshwater environment as presented in this report is deemed sufficient for planning and decision-making purposes; and
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked.

2 DEFINITIONS

The National Water Act, 1998 (Act No. 36 of 1998) is aimed at the protection of the country's water resources, defined in the Act as "a watercourse, surface water, estuary or aquifer". According to the National Water Act, 1998 (Act No. 36 of 1998) a **watercourse** means:

- (a) a river or spring;
- (b) a natural channel in which water flows regularly or intermittently;
- (c) a wetland, lake or dam into which, or from which, water flows; and
- (d) any collection of water which the Minister may, by notice in the *Gazette*, declare a watercourse.

The Act further provides definitions of wetland and riparian habitats as follows:

Wetland habitat is "land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil."

Riparian habitat includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.



3 OUTCOMES OF THE APPLICATION OF THE DEA SCREENING TOOL

The protocol for the assessment of freshwater biodiversity prepared in support of the (Department of Environment, Forestry and Fisheries (DEFF), 2020) National Web-based Environmental Screening Tool (hereafter the “screening tool”) provides the criteria for the assessment and reporting of impacts on aquatic biodiversity for activities requiring environmental authorisation. The assessment requirements of this protocol are associated with a level of environmental sensitivity determined by the screening tool. For aquatic biodiversity the requirements are for landscapes or sites which support various levels of biodiversity. The relevant aquatic biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute. Based on the sensitivity rating a suitably qualified specialist must prepare the relevant report or Opinion memo which is to be submitted as part of the environmental authorisation application.

The National Web-based Environmental Screening Tool (Department of Environment, Forestry and Fisheries (DEFF), 2020) indicates that the site is of ‘very high’ aquatic sensitivity due to the location of the proposed railway line within a Freshwater Ecosystem Priority Area quinary catchment. However, no watercourses or other aquatic features are indicated.

SAS was therefore appointed by Envirologistics to verify the validity of the results of the screening tool in line with Regulation 16(1)(v) of the Environmental Impact Assessment Regulations (2014), as amended as it pertains to the National Environmental Management Act, 1998 (Act No. 107 of 1998). A field assessment was undertaken as part of the verification process on the 4th of March 2021.

4 RESULTS OF THE DESKTOP ANALYSIS

4.1 *Analyses of Relevant Databases*

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard style” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible in order to allow for integration of results by the reader to take place. It is important to note that although all data sources used provide useful and often verifiable, high quality data, the various databases used do not always provide an entirely accurate indication of the study area’s actual site characteristics at the scale required to inform the environmental authorisation and/or water use licencing processes.



Given these limitations, this information is considered useful as background information to the study. It must however be noted that site verification of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process. Thus, this data was used as a guideline to inform the watercourse assessment and to focus on areas and aspects of increased conservation importance during the site assessment.



Table 1: Desktop data relating to the freshwater ecological characteristics of the proposed railway line and surrounding region.

Aquatic ecoregion and sub-regions in which the Railway Line Link Project is located		Detail of the Railway Line Link Project in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database	
Ecoregion	Southern Kalahari	FEPACODE	The Railway Line Link Project is situated within a subWMA considered a FEPA. River FEPAs achieve biodiversity targets for river ecosystems and threatened fish species, and were identified in rivers that are currently in a good condition (A or B ecological category). Although the FEPA status applies to the actual river reach, shading of the whole sub-quaternary catchment reach indicate that that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition of the river reach.
Catchment	Orange		
Quaternary Catchment	D73A		
WMA	Lower Vaal		
subWMA	Molopo		
Dominant characteristics of the Southern Kalahari (29.01) Aquatic Ecoregion Level 2 (Kleynhans <i>et al.</i> , 2007)		NFEPA Wetlands (Figure 3)	According to the NFEPA database there are no wetland features associated with the Railway Line Link Project, however a natural depression feature is indicated within the investigation area associated with the Calcrete Material Source Infrastructure Area. At the time that the database was collated, the depression feature was considered in a natural or good ecological condition (Class AB). The field assessment verified that the feature is a "cryptic wetland". Please refer to Section 5 for further detail.
Dominant primary terrain morphology	Plains: moderate relief. Closed Hills and Mountains: moderate and high relief. Extremely irregular plains (almost hilly), lowlands and hills, slightly irregular plains (scattered low hills and pans.	Wetland Vegetation Type	The Railway Line Link Project falls within the Eastern Kalahari Bushveld Group 3, which is considered Least Threatened (Mbona <i>et al.</i> , 2015).
		NFEPA Rivers	There are no river features associated with the Railway Line Link Project, nor are there any river features located within a 5km radius thereof.
Dominant primary vegetation types		Detail of the Railway Line Link Project in terms of the Northern Cape Critical Biodiversity Areas (2016) (Figure 5)	
Karroid Kalahari Bushveld, Kalahari Mountain Bushveld, Kalahari Plateau Bushveld		Other Natural Area (ONA)	The majority of the Railway Line Link Project falls within the ONA category. According to the Technical Guidelines for CBA Maps document ONA consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs (SANBI, 2017).
Altitude (m a.m.s.l)	700 to 1500	Ecological Support Area (ESA)	The eastern portion of the Railway Line Link and the central portion of the Calcrete Material Source Infrastructure Area is identified as an ESA. According to the Technical Guidelines for Critical Biodiversity Area (CBA) Maps document ESAs are areas which must retain their ecological processes in order to meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas; meet biodiversity targets for representation of ecosystem types or Species of special concern when it's not possible to meet them in CBAs; support ecological functioning of protected areas or CBAs or a combination of these (SANBI, 2017)
MAP (mm)	0 to 500		
Coefficient of Variation (% of MAP)	30 to 40		
Rainfall concentration index	60 to >65		
Rainfall seasonality	Late Summer		
Mean annual temp. (°C)	16 to 22		
Winter temperature (July)	0 - 22 °C		
Summer temperature (Feb)	16 to > 32 °C		
Median annual simulated runoff	<5 to 40	National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Figure 4)	
National Web Based Environmental Screening Tool (2020).		According to the NBA 2018: SAIIAE there are no wetland features or river features associated with the Railway Line Link Project however the depression feature identified within the Calcrete Material Source Infrastructure investigation area, identified by the NFEPA Database (2011) is identified by the NBA Dataset (2018). According to the NBA Dataset the depression feature is currently affected by roads, thus it is in a heavily to critically modified ecological condition (Class DEF).	
The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas.			
According to the screening tool the overall aquatic sensitivity of the Railway Line Link Project is very high due to the area being classified as a FEPA catchment, as indicated by the NFEPA Database (2011).			

CBA = Critical Biodiversity Area; NWBSP = North West Biodiversity Spatial Plan; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; ESA = Ecological Support Area; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; PES = Present Ecological State; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area.



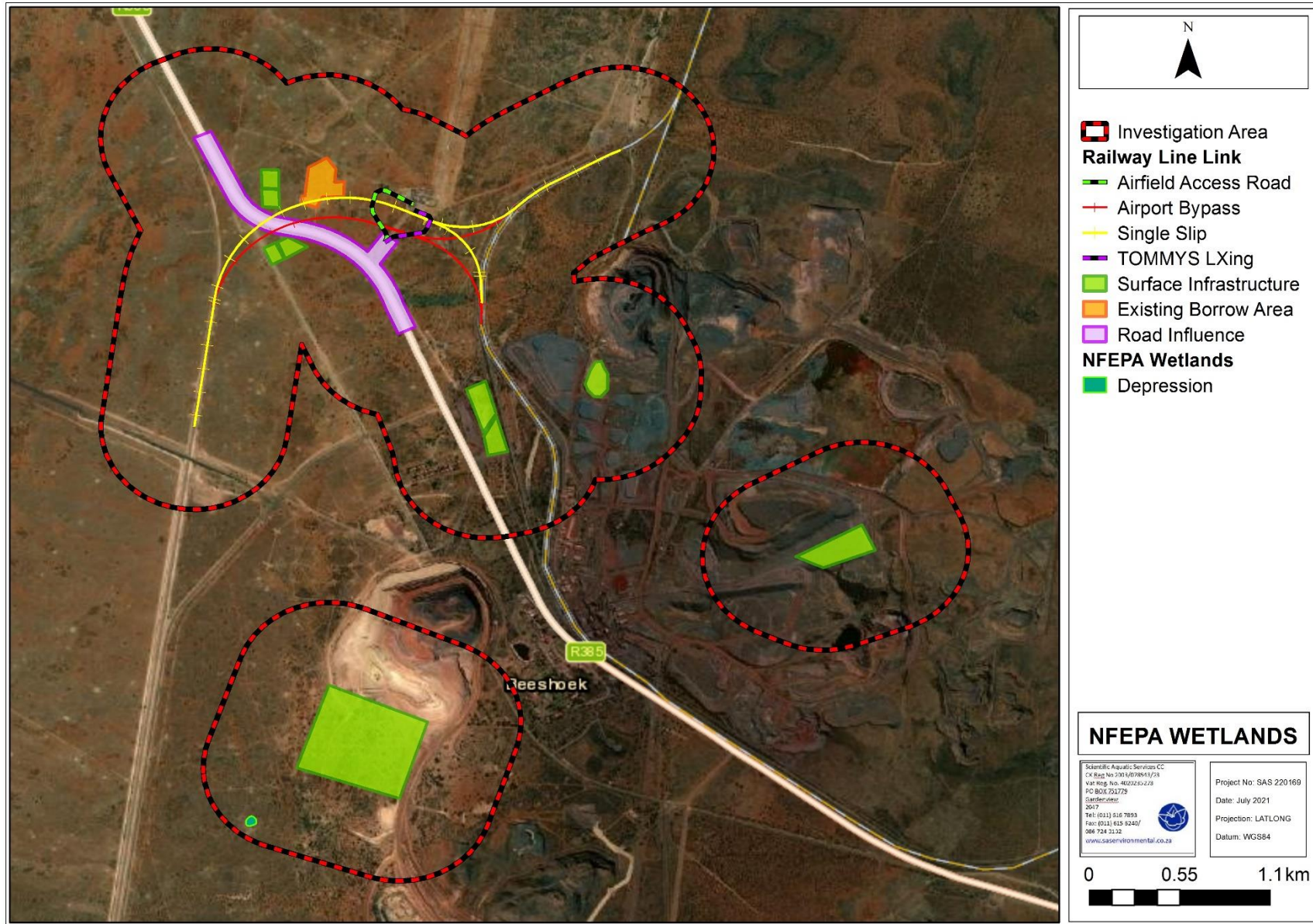


Figure 3: Location of the depression wetland (“cryptic wetland”) identified by the NFEPa (2011) database in the investigation area associated with the Calcrete Material Source area.



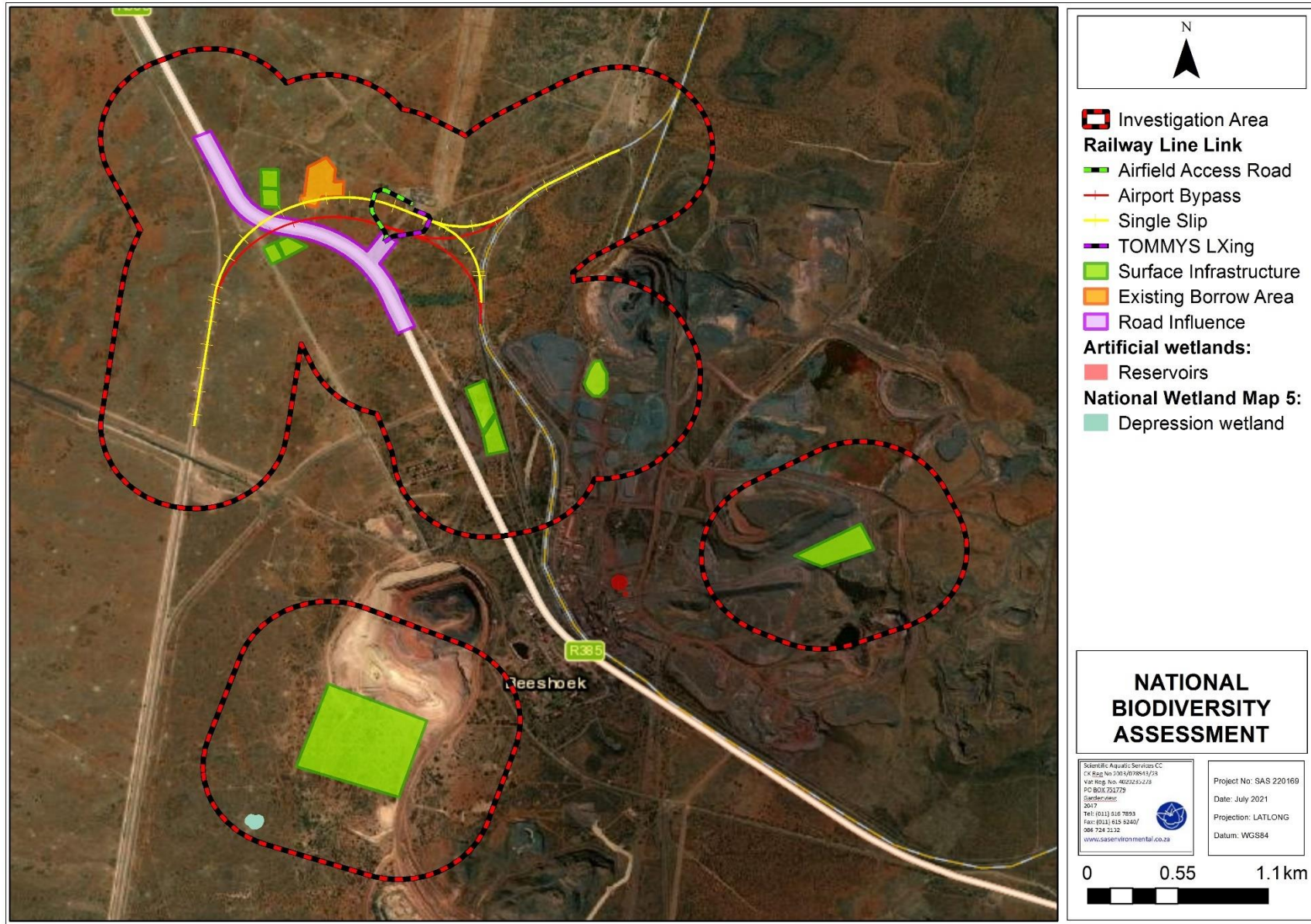


Figure 4: Location of the depression wetland (“cryptic wetland”) identified by the NBA (2018) database in the investigation area associated with the Calcrete Material Source area.





Figure 5: Ecological Support Areas and Other Natural Areas indicated by the Northern Cape Critical Biodiversity Areas (2016).



4.2 Review of Historical Aerial Imagery

In preparation for the field assessment, aerial photographs, digital satellite imagery and provincial and national watercourse databases were used to identify points of interest in the surrounding area at a desktop level. Signatures used to identify watercourses on digital satellite imagery or historical photographs include:

- Linear features: since water flows/moves through the landscape, watercourses often have a distinct linear element to their signature which makes them discernible on aerial photography or satellite imagery;
- Vegetation associated with watercourses: a distinct increase in density as well as shrub size near flow paths;
- Hue: water flow paths often show as white/grey or black and outcrops or bare soil displaying varying chroma created by varying vegetation cover, geology and soil conditions. Changes in the hue of vegetation are usually apparent with watercourse vegetation often indicated on black and white images as areas of darker hue (dark grey and black). In colour imagery these areas mostly show up as darker green and olive colours or brighter green colours in relation to adjacent areas where there is less soil moisture or surface water present; and
- Texture: with areas displaying various textures, created by varying vegetation cover and soil conditions.

Upon review of historical aerial photographs dated 1955 and 1966, no signatures (described above) indicating the potential presence of watercourses could be discerned within 100 m of the proposed railway line (Figure 6, overleaf).



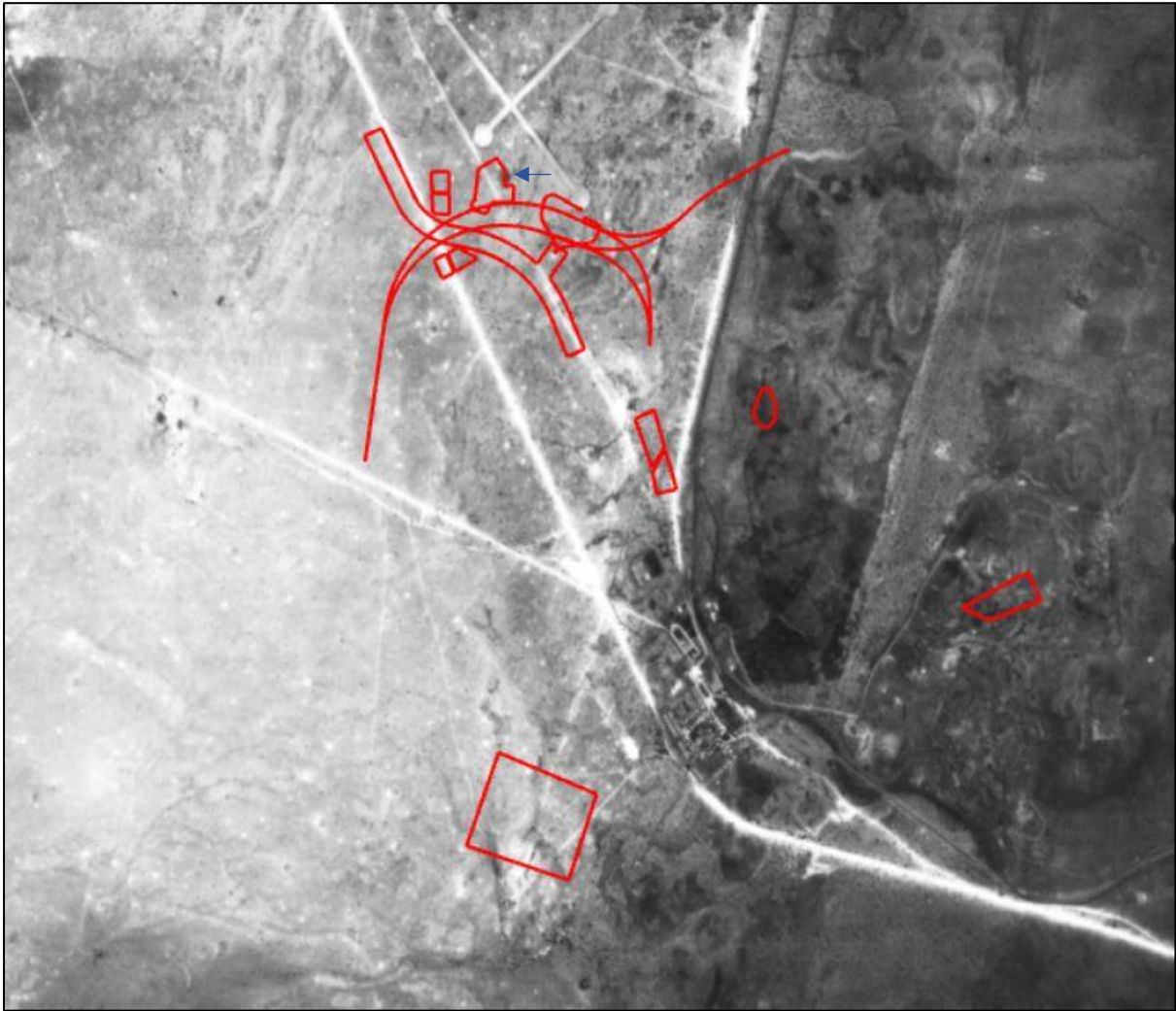


Figure 6: Aerial photograph dated 1966 of the vicinity, depicting the proposed railway line in relation to the surrounds. Although there are some indications of a potential pan slightly south of Tommy's Field Airport (indicated by the blue arrow), this feature no longer exists as it has been excavated.

Review of recent digital satellite imagery indicated area showing increased levels of greening, and two areas within the investigation area depicting a possible change in topography and texture which may be indicative of increased soil moisture, which in turn may indicate possible wetland conditions (Figure 7, Section 5). These areas were therefore targeted for field verification.

5 SITE ASSESSMENT RESULTS

A site visit was undertaken on the 4th March 2021, during which the proposed railway line development, the area within 100 m thereof, and the three areas targeted for field verification, were extensively investigated for the presence of any areas presenting with wetland or riparian characteristics as defined by the DWAF (2008) or watercourses as defined by the National Water Act, 1998 (Act No. 36 of 1998).

Visual comparisons between historical aerial photographs and recent digital satellite imagery reveals that the investigation area around the proposed railway, as well as the general surrounds, have been subjected to significant landuse changes, most notably, mining activities. The presence of infrastructure such as open pits, stockpiles and impermeable surfaces (for example the airfield to the north of the proposed railway, roads and buildings) have all contributed to altered catchment hydrology, resulting in changes to the flow, pattern and timing of water in the landscape.

During the site investigation, the following observations were made:

- The linear feature identified in Figures 7 and 9 possesses obligate floral species (*Typha capensis* and *Phragmites australis*) in the upgradient portion. However, the downgradient portion does not possess any facultative or obligate vegetation. Furthermore, this linear feature is not visible on the historical aerial imagery, nor is it indicated on the topographic maps for the area or any of the databases consulted (refer to Table 1). Moreover, typical obligate species such as *T. capensis* tend not to persist under “normal” (i.e. reference or undisturbed state) in arid zones typical of Postmasburg as there is usually insufficient moisture to sustain them. It is therefore deemed to have formed as a result of the aforementioned landuse changes in the catchment, although the specialist was unable to definitively confirm the source. It is considered highly unlikely to persist in the event that the anthropogenic influences in the catchment change or cease.
- Therefore, from an ecological perspective, this feature does not conform to the definition of a wetland as contained in the National Water Act, 1998 (Act No 36 of 1998) (refer to Section 2);





Figure 7: The upgradient reach of the artificial drainage line (left) depicting *T. capensis*, and the downgradient reach (taken during a field assessment in October 2020, for an initial feasibility study), showing the absence of obligate or facultative vegetation.

- The second and third areas earmarked for site investigation are best described as “seasonal depressions” (Figure 8). These are low-lying areas in the landscape with closed contours and therefore inwardly draining, however, the water does not remain in the features for a sufficiently long period to enable the establishment of facultative or obligate vegetation. In addition, the soil within the seasonal depressions are sandy, free-draining, high-chroma soils, lacking in morphological characteristics such as leaching of chroma and mottling. Therefore, the seasonal depressions do not meet the definition of a wetland as per the National Water Act, 1998 (Act No 36 of 1998) and were not assessed further.



Figure 8: The northern seasonal depression, in October 2020 (left) and (right) February 2021 (Acknowledgement: A. Pirie).

- The depression wetland indicated by the NFEPA (2011) and NBA (2018) datasets (Figures 3 and 4 in Section 3 above) in the investigation area associated with the proposed Calcrete Material Source area was defined as a “cryptic wetland” and is approximately 400 m from the proposed Calcrete Material Source area. Due to the

distance from the proposed Calcrete Material Source area and the landscape, the cryptic wetland is not considered to be at risk from the activities associated with the Calcrete Material Source area; and

- This cryptic wetland was assessed as part of the EIA study (SAS, 2021). Please refer to SAS (2021), Section 4.3.1, Table 3 for further detail pertaining to the ecological state of this cryptic wetland.

Based on the outcome of the site investigation as well as the supporting background information as presented in Section 3, it was determined that no watercourses are traversed by or located within 500 m of the proposed railway line. Only one “cryptic wetland” was identified within 500 m of the proposed Calcrete Material Source area, and was assessed as part of the freshwater ecological assessment undertaken as part of the EIA and water use authorisation processes for the proposed expansion activities within Beeshoek Mine (SAS, 2021).

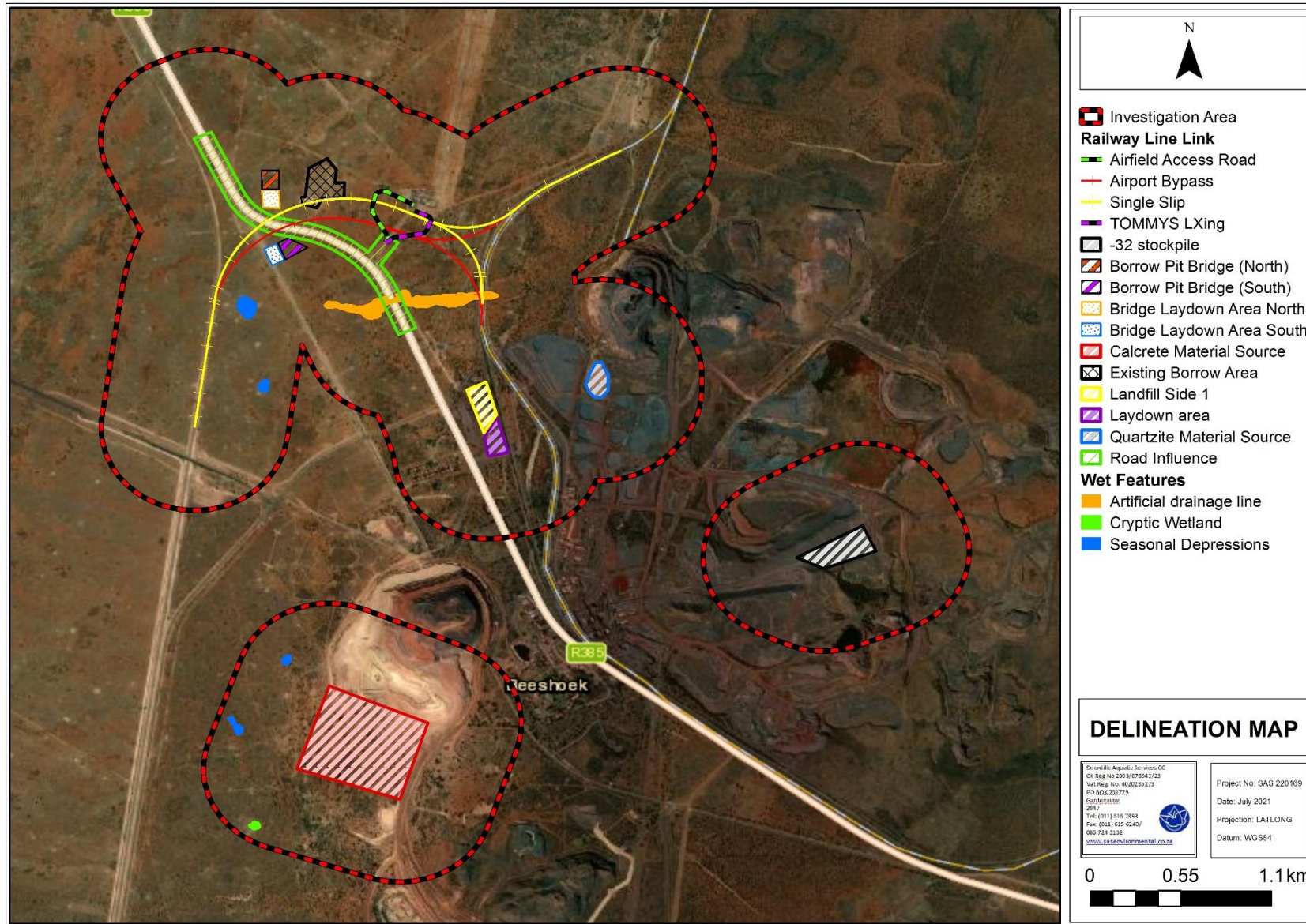


Figure 9: The location and approximate extent of the artificial drainage line, seasonal depressions and single cryptic wetland in relation to the proposed railway line and associated surface infrastructure.



6 OPPORTUNITIES AND CONSTRAINTS APPLICABLE TO THE DEVELOPMENT OF THE PROPOSED RAILWAY LINE

Although the proposed railway line is situated within a relatively undeveloped area, the areas to the east and south have been significantly altered by mining operations, and it was apparent during the site assessment that historical activities have occurred along the proposed route, which have altered the topography and floral communities associated with the proposed railway. No watercourses, as defined by the National Water Act, 1998 (Act No. 36 of 1998) were identified within 500 m of the proposed railway line. Due to the nature of the proposed development and the location thereof in relation to any identifiable drainage systems (in excess of 1 km from the proposed railway line), the development of the railway is considered to pose little to no risk to any freshwater ecosystems in the region. Therefore, it is the opinion of the specialist that there is no reason, from a freshwater resource management point of view, for the development to not be authorised.



7 REFERENCES

- Day, J., Day, E., Ross-Gillespie, V., and Ketley, A.** 2010. *The Assessment of Temporary Wetlands During Dry Conditions*. Report to the Water Research Commission (WRC). Report Number TT 434/09.
- Department of Water Affairs and Forestry (DWAF).** 2005. Final draft: A practical field procedure for identification and delineation of wetlands and Riparian areas.
- Department of Water Affairs and Forestry (DWAF).** 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Report no. X. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.
- Mbona, N., Job, N., Smith, J., Nel, J., Holness, S., Memani, S., and Dini, J.** 2015. *Supporting better decision making around coal mining in the Mpumalanga Highveld through the development of mapping tools and refinement of spatial data on wetlands*. Pretoria. WRC Report TT614/14.
- Nel, J.L., Driver, A., Strydom W.F., Maherry, A., Petersen, C., Hill, L., Roux, D.J., Nienaber, S., Van Deventer, H., Swartz, E. & Smith-Adao, L.B.** 2011. Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. Water Research Commission Report No. TT 500/11, Water Research Commission, Pretoria.
- NFEPA: Driver, A., Nel, J.L., Snaddon, K., Murrui, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. and Funke, N.** 2011. Implementation Manual for Freshwater Ecosystem Priority Areas. Water Research Commission. Report No. 1801/1/11. Online available: <http://bgis.sanbi.org/nfepa/project.asp>.
- Scientific Aquatic Services (SAS).** 2021. Freshwater Ecological Assessment as part of the Environmental Impact Assessment and Water Use Authorisation Processes for the Proposed Mining Expansion Activities at the Beeshoek Iron Ore Mine, Near Postmasburg, Northern Cape Province. Prepared for Envirogistics (Pty) Ltd. Unpublished specialist report.

